

REMARKS

Applicants have amended their claims in order to further clarify the definition of various aspects of the present invention. In summary, claims 14-16 and 19 have been cancelled without prejudice or disclaimer; claims 17, 18 and 20-23 have been amended; and new claims 24-34 have been added to the application.

Specifically, independent claim 14, the sole previous independent claim in the application, has been cancelled without prejudice or disclaimer, and new claim 24 substituted therefor. Claim 24 corresponds to previously considered claim 14, but recites an extended part, rather than an extruded part, extending from the thickened part; and also recites that the extruded frame member is adapted to be arranged adjacent another extruded frame member so as to be abutted to this another extruded frame member such that the friction stir welding of the extruded frame member and the another extruded frame member can be carried out; recites that the extended part of the extruded frame member is provided continuously and outwardly from the thickened part of the at least one end portion of a width of the at least one plate of the extruded member; and recites that the extended part of the extruded frame member further is arranged to overlap at least one plate of the another extruded frame member when the extruded frame member is arranged adjacent the another extruded frame member such that the friction stir welding can be carried out. Note, for example, Figs. 18 and 20 of Applicants' original disclosure, together with descriptions in connection therewith in the paragraph bridging pages 23 and 24, the two sole full paragraphs on page 24, and the two sole full paragraphs on page 25, of Applicants' specification.

In light of canceling of claim 14 and substitution therefor of claim 24,

dependencies of claims 17, 18 and 21-23 have been amended, and the claims have been amended to recite an --extended-- part, rather than an "extruded" part.

Moreover, claim 18 has been amended to recite that each of an outer surface of the thickened part and an outer surface of the extended part, in the width direction, are coplanar.

Applicants have cancelled claim 15 without prejudice or disclaimer, and have substituted therefor claim 25. Claim 25, dependent on claim 24, includes recitations set forth in previously considered claim 15, and additionally recites that the thickened and extruded parts are parts of the extruded frame member, and that the friction stir welding is carried out through the triangular-shaped groove. Claim 16 has been cancelled without prejudice or disclaimer, and new claim 26 substituted therefor. Claim 26, dependent on claim 24, includes recitations as in previously considered claim 16, and additionally recites that the extended part of the extruded frame member is positioned at a side of the at least one end portion of the at least one plate of the extruded frame member. Claims 27 and 28, dependent respectively on claims 24 and 27, respectively recites that the at least one plate has a surface which forms a surface of the extruded frame member, with the extended part having a surface extending from the thickened part, this surface of the extended part extending substantially in parallel to the surface of the at least one plate which forms a surface of the extruded frame member; and recites that the surface of the at least one plate which forms a surface of the extruded frame member is a surface exposed after the friction stir welding. Claim 29, dependent on claim 24, recites that the extended part extends to a level higher than a level of the at least one plate of the extruded frame member.

New claim 30 is an independent claim, containing the subject matter of previously considered claim 19, and also including recitations as in present claim 24. In light of new claim 30, claim 19 has been cancelled without prejudice or disclaimer.

Claims 31 and 32 expressly set forth subject matter in claims 27 and 28, respectively, but are dependent respectively on claims 30 and 31. Claims 33 and 34 are each dependent on claim 30, and respectively recite subject matter expressly set forth in claims 18 and 29. Claim 20 has been amended in light of new claim 30.

Applicants respectfully submit that all of the claims now presented for consideration by the Examiner patentably distinguish over the teachings of the reference as applied by the Examiner in rejecting claims in the Office Action mailed April 17, 2003, that is, the teachings of European Patent Application No. 797,043, under the provisions of 35 USC §102 and 35 USC §103.

It is respectfully submitted that this reference as applied by the Examiner would have neither taught nor would have suggested such an extruded frame member as in the present claims, having the thickened part which protrudes from a side of the at least one plate of the extruded frame member, in a thickness direction of the at least one plate of the extruded frame member, with this extruded frame member further including an extended part extending from the thickened part, substantially in parallel to the at least one plate of the extruded frame member and extending beyond the at least one end portion of the width of the at least one plate of the extruded frame member, in a direction of the width of the at least one plate of the extruded frame member, with the extended part being provided continuously and outwardly from the thickened part of the at least one end portion of a width of the at least one plate of the extruded frame member, this extended part further being

arranged to overlap at least one plate of another extruded frame member when the extruded frame member is arranged adjacent the another extruded frame member such that friction stir welding can be carried out. Note claim 24; see also claim 30.

In addition, it is respectfully submitted that the applied reference would have neither taught nor would have suggested such extruded frame member as discussed previously, having the thickened and extended parts, and wherein at an end portion of the at least one plate of the extruded frame member and under the extended part of the extruded frame member the at least one plate of the another extruded frame member is adapted to be positioned adjacent to the extruded frame member, with the end portion of the at least one plate of the extruded frame member being adapted to be abutted to an end side of the at least one plate of the another extruded frame member, for carrying out the friction stir welding of the extruded frame member and the another extruded frame member. Note claim 30.

Moreover, it is respectfully submitted that the applied reference would have neither disclosed nor would have suggested such an extruded frame member as in the present claims, having the thickened part and extended part as discussed previously, and having the additional features as in the remaining, dependent claims, including (but not limited to) wherein the at least one plate of the extruded frame member, and the thickened and extended parts, are formed integrally as one body (see claim 17); and/or wherein the extended part extends upward in the thickness direction of the at least one plate to a level above a level of this plate (see claims 29 and 34), in particular, wherein each of an outer surface of the thickened part and an outer surface of the extended part are, in the width direction, coplanar (see claims 18 and 33); and/or wherein the thickened part has a width that is substantially

equal to a width of the extended part (see claims 21 and 22); and/or wherein a side surface of the extended part, furthest from the thickened part, and a side surface of the thickened part, furthest from the extended part, extend obliquely (see claim 23); and/or wherein the triangular-shaped groove is provided, with friction stir welding being carried out through this groove (see claim 25).

The present invention is directed to an extruded frame member suitable for use in friction stir welding. In particular, the present invention involves such frame member, which can be formed simply and efficiently, whereby a raised portion need only be provided to one of the two members being joined by friction stir welding, yet wherein sufficient material is provided to avoid any resulting dents in the friction stir welded structure. That is, according to the present invention, a raised portion provided to one of the two frame members being joined by friction stir welding can be sufficient to avoid the need of both of the frame members having the raised portions.

Objectives according to the present invention are achieved utilizing the combination of thickened part and extended part as in the present claims, with the extended part being provided continuously and outwardly from the thickened part and being arranged to overlap at least one plate of another extruded frame member when the extruded frame member is arranged adjacent this another extruded frame member such that the friction stir welding can be carried out. That is, by use of such thickened and extended parts, only one of the two members being friction stir welded need have a raised portion, formed by extrusion. Moreover, the extended part can easily be provided overlapping the another extruded frame member being joined by friction stir welding, when such extended part is provided continuously and

outwardly from the thickened part.

In addition, by providing the triangular-shaped groove, positioning of the rotary tool during the friction stir welding can easily, accurately and effectively be achieved.

European Patent Application No. 797,043 discloses a friction stir welding method suitably applied to panel welding used, for example, for aluminum alloys to be used in railway cars and buildings. In the embodiment shown in Fig. 1 of No. 797,043, a joint configuration of abutting types between hollow shape members 31, 32 as panels is shown. The hollow shape members 31, 32 have vertical plates 36, 36 at their ends in the width direction. On the extension of the interface between the vertical plates 36, 36 lies the center of a projection 52 of a rotary tool used in friction stir welding. The vertical plates 36, 36 have a stiffness strong enough to sustain the downward force applied to the hollow shape members during the friction stir welding, with the vertical plates 36 being perpendicular to two plates 33, 34. See column 2, lines 39-43 and 47-52. Note also column 3, lines 11-15. In another embodiment shown in Fig. 7 of No. 797,043, in the joint region of the two hollow shape members 31, 32, each of these two hollow shape members is respectively provided with raised portions 37a, 38a protruding outside, which makes the joint region thick, the heights of the raised portions 37a, 38a being equal. See column 5, lines 37-42. In the joint configuration of Fig. 7, the rotary tool 50 plasticizes the raised portions 37a, 38a and forces them downward making up for lost volume of material 41. See column 5, lines 52-55. This structure of Fig. 7 in No. 797,043 includes projecting pieces 37, which project from plate 36. Note Fig. 5 and the description in column 5, lines 14-23 of No. 797,043.

It is respectfully submitted that No. 797,043 would have neither disclosed nor would have suggested the frame member as in the present claims, including the thickened and extending parts, particularly wherein the extended part extends from the thickened part, substantially in parallel to the at least one plate of the extruded frame member, and extending beyond the at least one end portion of the at least one plate of the extruded frame member, in a direction of the width of the at least one plate of the extruded frame member, the extended part being provided continuously and outwardly from the thickened part and being arranged to overlap at least one plate of the another extruded frame member. Clearly, as can be seen, for example, in Fig. 7 of No. 797,043, the projecting piece 38 having raised portion 38a overlaps the projecting piece 37 of the frame member 31, and it is respectfully submitted that this disclosure in No. 797,043 would have taught away from the overlap as in the present claims.

Applicants also respectfully traverse the contention by the Examiner that in No. 797,043, an extruded part extends "from the thickened part", substantially in parallel to the at least one plate of the extruded frame member. As can be seen, for example, in Fig. 7 of No. 797,043, the structure represented by reference character 37 extends from vertical plate 36, not raised portion 37a; and, accordingly, it is respectfully submitted that the structure as in, for example, Fig. 7 of No. 797,043 would have taught away from that aspect of the present invention having the extended part extending from the thickened part as in the present invention. That is, it is respectfully submitted that the extruded part extends from the vertical plate in No. 797,043, not from the thickened part.

Assuming, arguendo, that the thickened part is represented by reference

character 37a in Fig. 7 of No. 797,043, such a part represented by reference character 37 in Fig. 7 would not "extend from" the thickened part, but rather extends from the vertical plate 36 as described in No. 797,043.

It is emphasized that the structure represented by reference character 37 in Fig. 7 of No. 797,043 extends from vertical plate 36, not from raised portion 37a; and it is respectfully submitted that No. 797,043 would have taught away from the extended part extending from the thickened part as in the present claims, the structure of these claims providing advantages wherein a single raised structure can be provided in joining two adjacent frame members by friction stir welding.

Furthermore, again referring to the structure represented by reference characters 37a and 37 in No. 797,043, clearly the teachings thereof would have neither disclosed nor would have suggested, and in fact would have taught away from, wherein an outer surface of the thickened and extended parts, in the width direction, are coplanar; or wherein the extended part extends to a level higher than the level of the plate.

It must be emphasized that in the structure shown in Fig. 7 of No. 797,043, each of frame members 31 and 32 have raised portions, respectively represented by reference characters 37a and 38a. This structure as in Fig. 7 is just such structure, wherein each of the frame members joined by friction stir welding have raised portions, which can be avoided according to the present invention, wherein only one of the two frame members need to include the raised portion, which can extend so as to overlap the other of the two frame members (e.g., the raised portion, having the thickened part, including the extended part).

Again, as seen in Fig. 7 of No. 797,043, the raised portion 38a overlaps

projecting portion 37, rather than the overlapping as in the present claims.

Achieving such overlap as in the present claims, only one of the two members being friction stir welded need have a raised portion, providing advantages as discussed previously. Clearly, No. 797,043 would have neither taught nor would have suggested, and in fact would have taught away from, the presently claimed subject matter, and advantages thereof.

In the last two lines on page 2 of the Office Action mailed April 17, 2003, the Examiner references the extruded (now extended) part by reference character 36 in Fig. 7, while previously the Examiner has referenced the thickened part by reference character 36 of Fig. 7. It is respectfully submitted that the Examiner is inconsistent in designating parts of Fig. 7 corresponding to the presently claimed subject matter. In any event, assuming, arguendo, that reference character 36 corresponds to the extruded (extended) part of the present claims, the subject matter of No. 797,043 would have taught away from that aspect of the present invention wherein the extended part extends substantially in parallel to the at least one plate of the extruded frame member, as in the present independent claims, in particular, in parallel to a surface of the at least one plate which forms a surface of the extruded frame member (note claims 27 and 31).

Applicants respectfully traverse the conclusion by the Examiner that the structure of Fig. 7 shows a side surface of the extruded part and of the thickened part extending obliquely.

The contention by the Examiner in connection with claim 19, in lines 2-8 on page 3 of the Office Action mailed April 17, 2003, is respectfully traversed. It is respectfully submitted that Fig. 7 of No. 797,043 shows raised portion 38a being

over projecting piece 37, which would have taught away from the presently claimed subject matter as in claim 30, particularly recitation in claim 30 with respect to overlap.

The contention by the Examiner in the first full paragraph on page 3 of the Office Action mailed April 17, 2003, with respect to claims 19 and 20, is noted. It is respectfully submitted that the “adapted to” language must be considered “in a patentable sense” in that the structure must be able to perform the function, even if not disclosed in the reference as performing such function. Thus, Applicants specifically traverse the conclusion by the Examiner that the “adapted to” language “does not constitute a limitation in any patentable sense”. As can be seen in Fig. 7, the structure shown therein for frame member 31 is not “adapted to” perform the recited function in present claims 30 and 20, noting positioning of projecting pieces and raised portions. Thus, it is respectfully submitted that treating the “adapted to” language as required, the structure in No. 797,043 is not “adapted to” perform the recited function, and such structure in Fig. 7 would have neither disclosed nor would have suggested the presently claimed extruded frame member as in, for example, claims 30 and 20.

The contention by the Examiner in connection with claims 15 and 21, that No. 797,043 discloses a thickened part (37a) which protrudes from a side of the at least one plate (33), with the extruded frame member further including an extruded part extending from the thickened part (36), is noted. Where the structure represented by reference numeral 36 constitutes the extended part, it is respectfully submitted that the structure of No. 797,043 would have neither disclosed nor would have suggested the extended part substantially in parallel to the at least one plate of

the extruded frame member, and extending beyond the at least one end portion of the width of the at least one plate of the extruded frame member, with such extended part being provided continuously and outwardly from the thickened part and being arranged to overlap at least one plate of another extruded frame member, as in the present claims.

In addition, and contrary to the conclusion by the Examiner, it is respectfully submitted that the Examiner has not established that No. 797,043 discloses a groove, much less a triangular-shaped groove as in the present claims. In this regard, the Examiner points to reference character 45 of Fig. 8, as being a groove formed between an outer surface of the thickened part and an outer surface of the extruded part. However, it is emphasized that Fig. 8 of No. 797,043 discloses structure after friction stir welding; and does not disclose, nor would have suggested, an extruded frame member for use in friction stir welding, having the thickened and extended parts and groove, as in the present claims. In this regard, construing Fig. 8 as done by the Examiner, there is essentially no longer, e.g., a thickened part, and thus the structure of Fig. 8 would have neither taught nor would have suggested, either alone or in combination with the structure of Fig. 7, the extruded frame member of claims 21 and 25.

Attached hereto is a marked-up version of the changes made to the claims by the current Amendment. The changes are shown in the Attachment captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE".

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To the extent necessary, Applicants petition for an extension of time under 37 CFR § 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Deposit Account No. 01-2135 (Case No. 503.35933VV5) and please credit any excess fees to such Deposit Account.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

17. (Amended) An extruded frame member according to claim [14] 24, wherein said at least one plate of said extruded frame member, said thickened part, and said [extruded] extended part are formed integrally as one body.

18. (Amended) An extruded frame member according to claim [14] 24, wherein each of an outer surface of said thickened part and an outer surface of said [extruded] extended part, in the width direction, are coplanar.

20. (Amended) An extruded frame member according to claim [19] 30, wherein during the friction stir welding, material of said thickened part and of said [extruded] extended part is adapted to fill up any gaps, between said at least one plate of said extruded frame member and said at least one plate of said another extruded frame member, which exist when said extruded frame member abuts said another extruded frame member.

21. (Amended) An extruded frame member according to claim [15] 25, wherein said thickened part has a width that is substantially equal to a width of said [extruded] extended part.

22. (Amended) An extruded frame member according to claim [14] 24, wherein said thickened part has a width that is substantially equal to a width of said [extruded] extended part.

23. (Amended) An extruded frame member according to claim [14] 24,  
wherein a side surface, of the [extruded] extended part, furthest from the thickened  
part, and a side surface of the thickened part, furthest from the [extruded] extended  
part, extend obliquely.